REMARKS

Claims 1-28 are in the application, of which Claims 1, 8, 15 and 27 are the independent claims. Claims 1-5 and 7-20 have been amended. New Claims 21-28 have been added. Reconsideration and further examination are respectfully requested.

No new matter is believed to have been introduced to the application by this amendment. The subject matter added to Claims 1, 8, 15 and 27 is fully supported by the original disclosure and claims, including, for example, paragraphs [12], [33], [35], [54], [55] and [60] and original Claims 1, 8 and 15. The subject matter added to Claims 2, 9 and 16 is fully supported by the original disclosure and claims, including, for example, paragraph [52] and Fig. 4A. The subject matter added to Claims 3 and 10 is fully supported by the original disclosure and claims, including, for example, original Claims 1 and 8. The subject matter added to Claims 4, 11, 17 and 28 is fully supported by the original disclosure and claims, including, for example, paragraphs [10], [11] and [65]. The subject matter added to Claims 7, 12 and 18 is fully supported by the original disclosure and claims, including, for example, paragraphs [11] and [35].

The subject matter added to Claim 13 is fully supported by the original disclosure and claims, including, for example, paragraph [11]. The subject matter added to Claim 19 is fully supported by the original disclosure and claims, including, for example, paragraph [52]. The subject matter of new Claims 21-23 is fully supported by the original disclosure and claims, including, for example, paragraphs [35], [46], and [55]. The subject matter of new Claim 24 is fully supported by the original disclosure and claims, including, for example, paragraph [12]. The subject matter of new Claim 25 is fully supported by the original disclosure and claims, including,

for example, paragraph [14]. The subject matter of new Claim 26 is fully supported by the original disclosure and claims, including, for example, paragraphs [12], [39] and [59].

In the specification, new paragraphs [18A], [18B], [18C] and [18D] are added simply to repeat the subject matter of the amended/new independent claims in the summary section of the invention. Paragraphs [11] and [12] have been amended to correct typographical errors.

Initially, Applicants appreciate that the drawings previously submitted were accepted by the Examiner.

In the Office Action, Claims 1-5, 7-8, 10-11 and 14-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by "Powerful 3D-Visualization for Demanding Users" (VirtualGIS); Claim 6 was rejected under 35 U.S.C. § 103(a) over VirtualGIS in view of "Towards Augmented Reality Gaming" (Starner) in view of Starner; Claims 9 and 12 were rejected under 35 U.S.C. § 103(a) over VirtualGIS in view of Starner in view of "VRML as a Tool for Web-Based, 3D Photo-Realistic GIS" (Coltekin). Reconsideration and withdrawal of these rejections are respectfully requested.

The present invention generally concerns augmented reality systems and methods. According to one exemplary embodiment of the present invention, a viewer wears a pair of heads-up glasses on which a video camera is mounted. The video camera can take real-world images from the viewer's view point. Using the pair of heads-up glasses, the viewer can view a real-world image taken from the video camera overlaid with a computer generated image of a virtual world. Special pre-defined markers can be placed in the real world (e.g., on a table) to determine the position of the viewer with respect to the real world and then to determine the position of the viewer with respect to the virtual world. See, e.g., paragraphs [11], [33], [35], [52] and [60], and Fig. 4A.

For illustration purposes only, Appendix A is attached herein to explain one example of the invention without limiting the invention. In Appendix A, a viewer is wearing a pair of heads-up glasses. Using the pair of heads-up glasses, the viewer can see not only the images of the virtual world (e.g., the globe and the satellites circling the globe) but also the images of the real world (e.g., the table and the room he is in). A camera that is mounted on the pair of heads-up glasses can take pictures of the real world (e.g., the table and the room) and display them on the pair of heads-up glasses. Special pre-defined color-coded markers can be placed, for example, on the table in front of the viewer in the real world. These markers can be used to determine the position and orientation of the viewer in the room (the real world), and this real-world position can be translated into a position of the viewer in the virtual world.

For illustration purposes only without limiting the invention, assume a real world in which two viewers (a first viewer and a second viewer) are present in a room, and further assume that a cup is placed on a table, and each of the viewers is wearing a pair of heads-up glasses. Further assume that the first viewer is facing the front side of the cup placed on the table (the real world), and the second viewer, on the opposite side of the table, is facing the back side of the cup placed on the table (the real world). After the first viewer's position and orientation and the second viewer's position and orientation in the real world are determined, these real-world positions and orientations of the two viewers can be translated into virtual-world positions and orientations. This allows, for example, the first viewer to see the front of the globe (as a virtual-world image instead of the cup) and allows the second viewer to see the back side of the globe (as his virtual-world image instead of the cup).

With reference to particular claim language, independent Claim 1 is directed to a visualization system for a computer system. The system comprises a positioning portion

configured to determine a position of a viewer with respect to a real world and a position of the viewer with respect to a virtual world. The positioning portion is also configured to allow the viewer to interact with the virtual world. The system further comprises a modeling portion configured to specify the virtual world in response to a model of the virtual world and a model specification portion configured to specify a representation of satellite status data in response to the position of the viewer with respect to the virtual world and in response to satellite status data. The system also comprises an output portion configured to provide an image of the virtual world super-imposed on an image of the real world. The image of the virtual world includes the representation of the satellite status data to the viewer in response to the position of the viewer with respect to the virtual world.

Independent Claim 8 is directed to a method for visualization of augmented reality. The method comprises: determining a position of a viewer with respect to a real world and a position of the viewer with respect to a virtual world; determining a model of the virtual world; determining a representation of satellite status data in response to the position of the viewer with respect to the virtual world and in response to satellite status data; and displaying to the viewer a representation of the virtual world super-imposed on a representation of the real world. The representation of the virtual world includes the representation of the satellite status data in response to the position of the viewer with respect to the virtual world.

Independent Claim 15 is directed to a visualization method for a computer system. The method comprises: displaying to a viewer a representation of a real world overlaid with a representation of a virtual world. The representation of the virtual world includes satellite status data. In addition, the representation of the virtual world is determined in response to a model of the virtual world, and in response to a position of the viewer with respect to the virtual world. The

representation of the satellite status data is determined in response to satellite status data, and in response to a position of the viewer with respect to the virtual world. Furthermore, the viewer is allowed to interact with the virtual world.

Independent Claim 27 is directed to a visualization system for a computer system. The system comprises a positioning portion configured to determine a position of a viewer with respect a real world and a position of the viewer with respect to a virtual world. The positioning portion is also configured to allow the viewer to interact with the virtual world. The system further comprises a modeling portion configured to specify the virtual world in response to a model of the virtual world and a model specification portion configured to specify a representation of object status data in response to the position of the viewer with respect to the virtual world and in response to the object status data. The system also comprises an output portion configured to provide an image of the virtual world super-imposed on an image of the real world. The image of the virtual world includes the representation of the object status data to the viewer in response to the position of the viewer with respect to the virtual world.

The applied references are not understood to disclose or suggest the features of independent Claims 1, 8 and 15, particularly with respect to at least the features of:

> a positioning portion configured to determine a position of a viewer with respect to a real world and a position of the viewer with respect to a virtual world . . . and an output portion configured to provide an image of the virtual world super-imposed on an image of the real world, the image of the virtual world including the representation of the satellite status data to the viewer in response to the position of the viewer with respect to the virtual world, as recited in Claim 1;

determining a position of a viewer with respect to a real world and a position of the viewer with respect to a virtual world . . . and displaying to the viewer a representation of the virtual world super-imposed on a representation of the real world, the representation of the virtual world including the representation of the satellite status data in response to the position of the viewer with respect to the virtual world, as recited in Claim 8; and

displaying to a viewer a representation of a real world overlaid with a representation of a virtual world, the representation of the virtual world including satellite status data, . . . wherein the representation of the satellite status data is determined in response to satellite status data, and in response to a position of the viewer with respect to the virtual world, as recited in Claim 15.

Turning to the applied references, VirtualGIS—which appears to be the main reference relied upon in the Office Action—is directed to viewing a virtual environment on a computer screen. See VirtualGIS, Viewing the world in beautiful 3D, 1st paragraph. VirtualGIS, however, does not disclose nor suggest viewing an image of the virtual environment with an image or representation of the real world as the viewer moves around his real setting. In addition, while VirtualGIS describes images captured from a satellite (e.g., satellite images) (see VirtualGIS, Data for the 3D world, 1st paragraph), VirtualGIS does not disclose nor suggest displaying satellite status data. Satellite status data is information about the satellite and is different from images captured from a satellite. Satellite status data can be, for example, without limitation, any of the following (as listed in some of the dependent claims): satellite orbit, a current position of a satellite, a past position of a satellite, a future position of a satellite, an orientation of a satellite, ground coverage of a satellite, a trajectory of a satellite, satellite sensor orientation, satellite sensor position, a satellite's orientation vectors to other satellites or objects, a satellite's coverage analysis

when the satellite is in a view of a region, satellite revisit time, a satellite communication link or network, beam strength of space, satellite systems status, and satellite system design data.

Furthermore, while VirtualGIS discloses geographic position of the viewer in the virtual environment (see VirtualGIS, Viewing the world in beautiful 3D, 1st paragraph), VirtualGIS does not disclose nor suggest determining the position of the viewer with respect to a real world, as recited in Claims 1 and 8. (Please note that dependent Claims 2, 9 and 16 recite a marker positioned in the real world (not in the virtual world), and this real-world marker, for instance, allows the position of the viewer to be determined with respect to the real world. This feature is also not present in VirtualGIS.)

The other references are not understood to remedy all of the foregoing deficiencies of VirtualGIS.

Accordingly, the applied references, either alone or in combination, are not understood to disclose, teach, or suggest the features of independent Claims 1, 8 and 15, which are believed to be in condition for allowance.

Dependent claims 2-7, 9-14 and 16-20 currently under consideration in the application are dependent from independent Claim 1, 8 or 15 discussed above and therefore are believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, the individual consideration of each on its own merits is respectfully requested.

Newly added Claims 21-28 are also believed to be allowable.

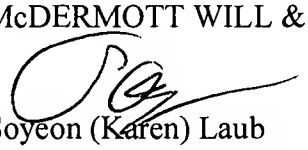
In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest

convenience. Applicants' undersigned attorney may be contacted at the address and telephone number set forth below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 502203 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP



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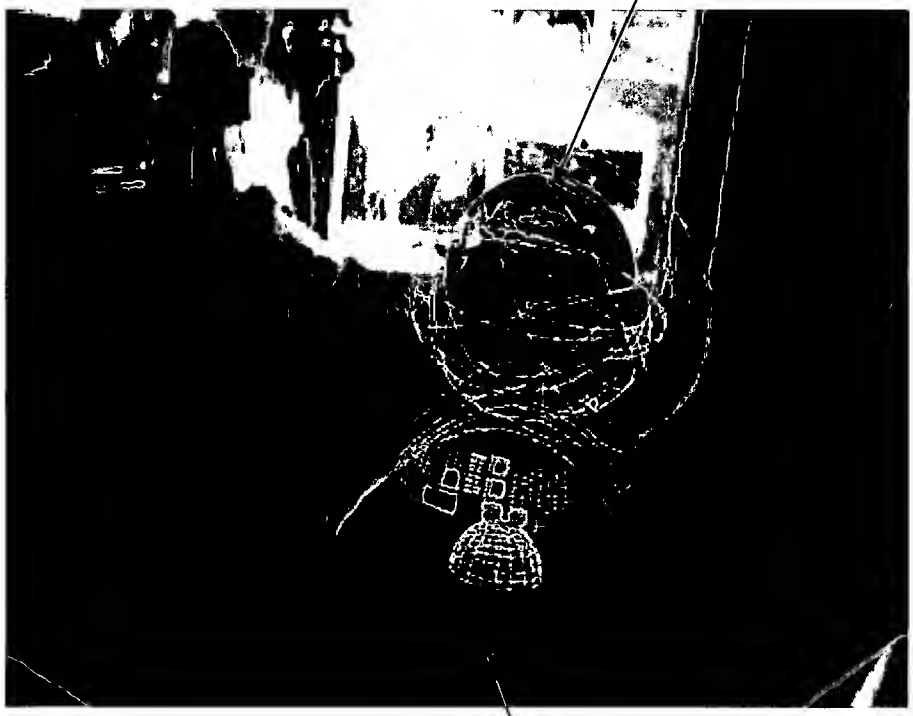
APPENDIX A

Viewer with a pair of heads-up glasses

Globe and satellites circling the globe



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